INSTRUCTIONS

POWER PLANT REMOVAL AND INSTALLATION, AND GENERATOR ALIGNMENT

GE-7FDL 8- AND 12-CYLINDER ENGINES

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DESCRIPTION

The engine is mounted on four pedestals welded to the locomotive deck. One pedestal is under each corner of the engine.

At the generator end, the engine is bolted solidly to the pedestal on each side. Wedges between the engine mounting pads and these pedestals prevent the engine from shifting longitudinally.

* Two designs have been used for securing the wedges to the pedestals. The old design used retaining plates to control the vertical position of the wedge and to secure the wedge to the pedestal. See Fig. 1 and 5. The current-production design has horizontal grooves which control the vertical position of the wedge; the outer ends of the wedges are tack-welded directly to the pedestal. See Fig. 2, 3 and 5.

At the free end of the engine, spring-loaded bolts hold the engine down but permit enough movement to allow for thermal expansion as the engine heats and cools with varying loads. (See Fig. 4 and 5.)

*Revisions are indicated by marginal bars.

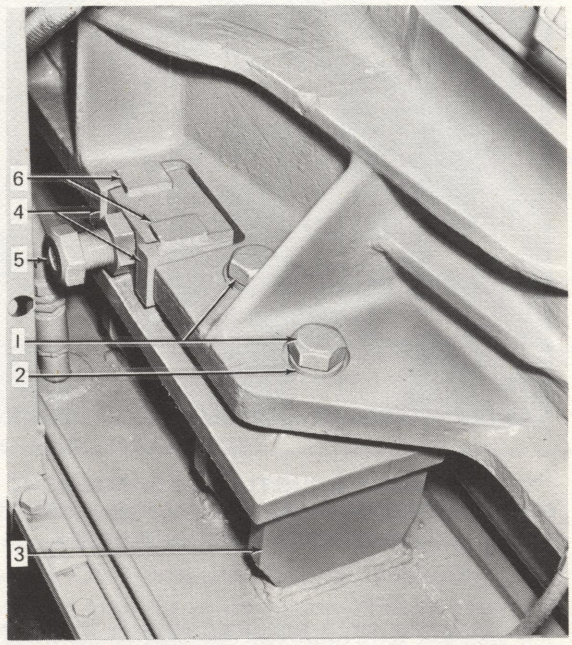


FIG. 1, E-13252

REF.	DESCRIPTION
1	MOUNTING BOLTS
2	LOCKWASHER
3	ENGINE MOUNTING PEDESTAL
4	WEDGES
5	JACKING BOLT
6	WEDGE RETAINING PLATES

FIG. 1. ENGINE MOUNTING ARRANGEMENT — GENERATOR END, OLD DESIGN.

A horizontal jacking bolt in each pedestal serves two purposes:

1. It restricts engine movement in the transverse direction.
2. It can be used to position the engine laterally during alignment of the auxiliary drive couplings.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

Verify numbers for parts, tools, or material by using the Renewal Parts or Tool Catalogs, or contact your General Electric representative for assistance. Do not order from this publication.

GENERAL ELECTRIC

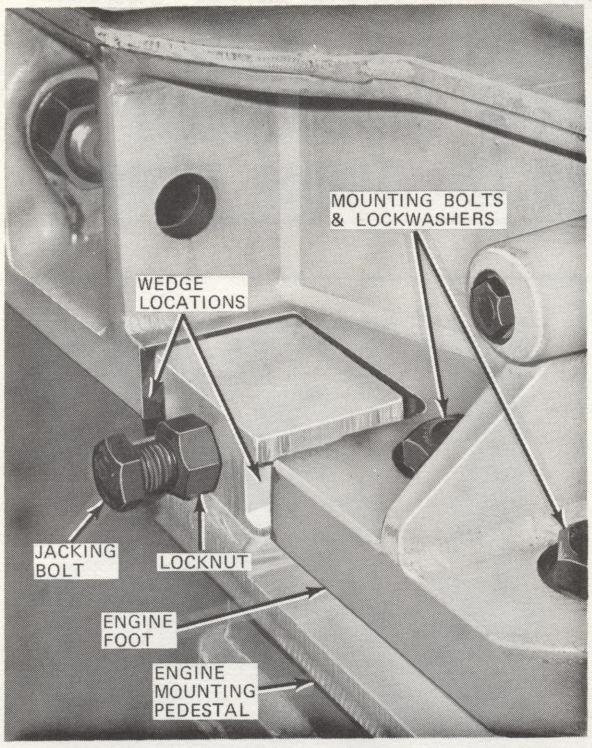


FIG. 2. ENGINE MOUNTING ARRANGEMENT — GENERATOR END — BEFORE WEDGE ASSEMBLY, CURRENT-PRODUCTION DESIGN.

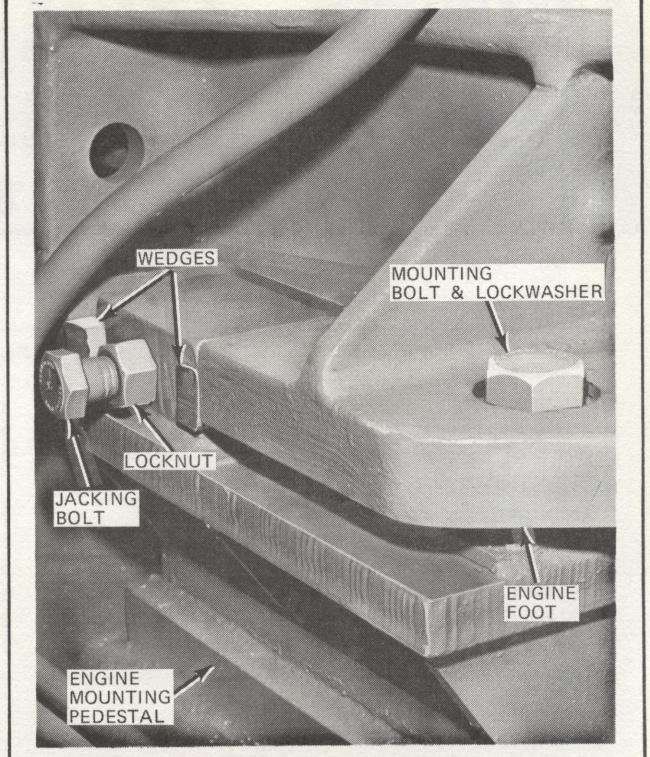


FIG. 3. ENGINE MOUNTING ARRANGEMENT — GENERATOR END — WITH WEDGES ASSEMBLED, CURRENT-PRODUCTION DESIGN.

FIG. 2, E-21690

FIG. 3, E-21691

The generator set is supported entirely by the engine. The generator armature is bolted solidly to the engine crankshaft on a rabbet fit. The generator frame is bolted to the engine main frame at four mounting pads. Alignment is maintained by dowels in the two upper mounting pads and shims, between the mounting pads and the main frame.

LIFTING ENGINE AND GENERATOR

When lifting the engine, either with or without the generator, attachment should be made only at those points provided on the engine. Lifting at other points may cause damage.

The engine has one lifting eye on each side of the main frame above the mounting pad, near the free end. The third point is at the large eye on top of the main frame at the generator end. The recommended lifting device and arrangement is shown in Fig. 6. With this rig, the entire weight of the engine and generator may be lifted by a single crane hook. Use the appropriate holes as marked on the lifting device.

CAUTION: *Do not attach lifting slings to the large eyes on the generator when lifting the engine-generator set as a combination. Generator eyes are designed to support the weight of the generator only. Use of them to lift part of the engine weight may result in damage.*

To lift only the generator, without the auxiliary machines attached, two cable slings, each approximately 48 in. long, may be attached to the large lifting eyes on the top of the generator frame. When the auxiliary machines are attached, add a chain hoist to the lifting eye on the front of the generator. By adjusting the chain, the generator can be properly aligned with the engine.

POWER PLANT REMOVAL

To remove the engine and generator from the locomotive, proceed as follows:

1. Remove the complete engine-hood assembly. See Engine Hood Removal instructions.

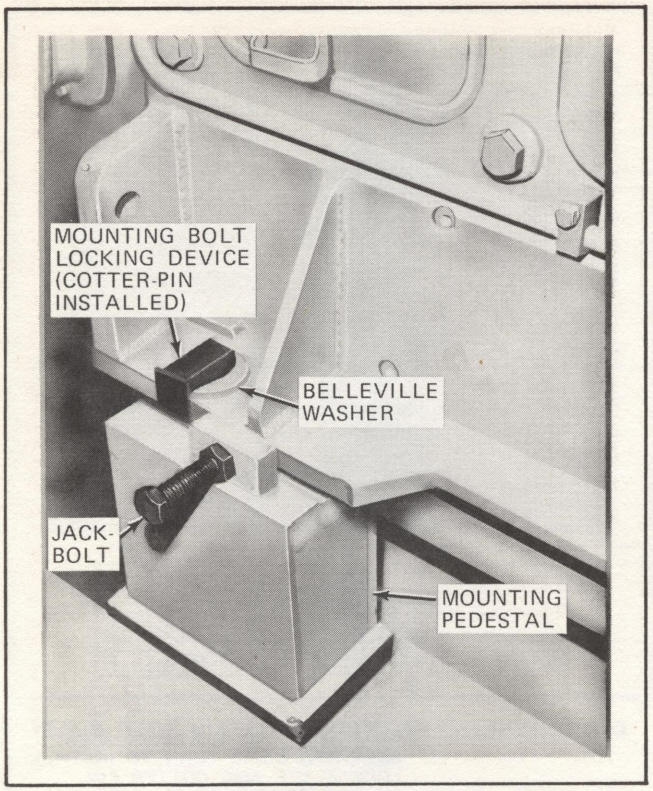


FIG. 4. ENGINE MOUNTING ARRANGEMENT — FREE END.

2. Drain the cooling-water and lubricating-oil systems. Disconnect all piping connections between the engine and the platform, fuel inlet and drain lines, lubricating-oil drain lines, etc. Seal all pipe ends to prevent the entrance of dirt.

3. Disconnect the air duct to the turbocharger; then, disconnect and remove the compressor drive shaft.

4. Disconnect all wiring between the platform and the main generator and the auxiliaries. Tie the wire ends clear of the power plant.

5. Remove the engine hold-down bolts. Back off the horizontal jacking bolts several turns. Break the tack-welds, and remove the wedges located in each of the pads at the generator end of the engine.

NOTE: *If the same engine is to be reinstalled in the locomotive, alignment time may be saved by turning the jacking bolts on one side of the engine in snug against the frame, while those on the other side are backed-off to allow clearance. Also, only the wedges toward the free-end of the engine need to be removed. During installation, the engine can be placed against these established reference points; thus only minor adjustments will be required to properly align the power plant.*

6. The lifting rig now may be attached, and the complete power plant removed from the locomotive.

If desired, the generator may be disconnected from the engine and lifted out first. See REMOVING GENERATOR FROM ENGINE section.

REMOVING GENERATOR FROM ENGINE

PRELIMINARY

If the generator is to be removed while the engine is in place in the locomotive, the following preliminary steps must be taken:

1. If only the generator is to be removed, remove the entire engine-hood assembly. See the Engine Hood Removal instructions.

2. Remove the main generator electrical connections.

3. Uncouple and remove the traction-motor blower from the generator auxiliary drive shaft.

REMOVING GENERATOR

NOTE: *Insert heavy hard-paper or fiber-strip shims between the generator fan and the generator frame to support the armature, before uncoupling the generator from the engine, or any time the generator is lifted alone. Remove the shims after coupling the generator to the engine.*

1. Remove the cover from the left-bank camshaft gear. Through this opening, remove the twelve bolts connecting the crankshaft to the generator armature.

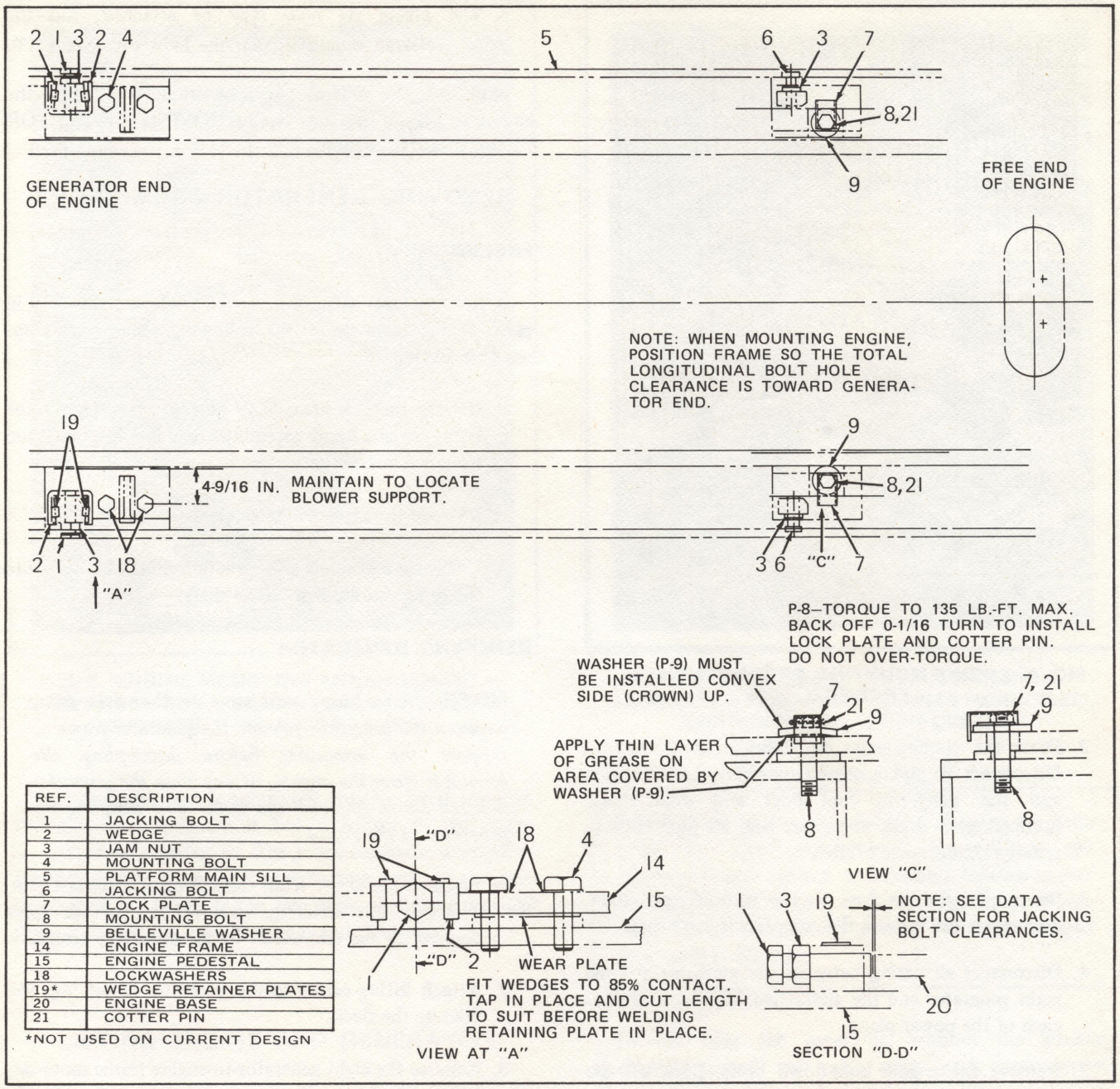
2. Attach lifting cables to the generator lifting lugs and take up the slack.

3. Remove the eight generator-to-engine frame mounting bolts. Then, work the generator evenly off the aligning dowels located in the upper two mounting pads. Use a pry bar as necessary to prevent the generator from binding at the engine frame.

When the generator shims from the upper mounting pads have been freed, collect and tag them for return to their original locations when reinstalling the generator.

ENGINE AND GENERATOR INSTALLATION

Installation of the engine and generator in the locomotive is essentially the reverse of the above procedure.


GENERATOR END OF ENGINE
FREE END OF ENGINE
NOTE: WHEN MOUNTING ENGINE, POSITION FRAME SO THE TOTAL LONGITUDINAL BOLT HOLE CLEARANCE IS TOWARD GENERATOR END.
4-9/16 IN. MAINTAIN TO LOCATE BLOWER SUPPORT.
"A"
"C"
P-8—TORQUE TO 135 LB.-FT. MAX. BACK OFF 0-1/16 TURN TO INSTALL LOCK PLATE AND COTTER PIN. DO NOT OVER-TORQUE.
WASHER (P-9) MUST BE INSTALLED CONVEX SIDE (CROWN) UP.
APPLY THIN LAYER OF GREASE ON AREA COVERED BY WASHER (P-9).
"D"
WEAR PLATE
FIT WEDGES TO 85% CONTACT. TAP IN PLACE AND CUT LENGTH TO SUIT BEFORE WELDING RETAINING PLATE IN PLACE.
VIEW AT "A"
VIEW "C"
NOTE: SEE DATA SECTION FOR JACKING BOLT CLEARANCES.
SECTION "D-D"

REF.	DESCRIPTION
1	JACKING BOLT
2	WEDGE
3	JAM NUT
4	MOUNTING BOLT
5	PLATFORM MAIN SILL
6	JACKING BOLT
7	LOCK PLATE
8	MOUNTING BOLT
9	BELLEVILLE WASHER
14	ENGINE FRAME
15	ENGINE PEDESTAL
18	LOCKWASHERS
19*	WEDGE RETAINER PLATES
20	ENGINE BASE
21	COTTER PIN

*NOT USED ON CURRENT DESIGN

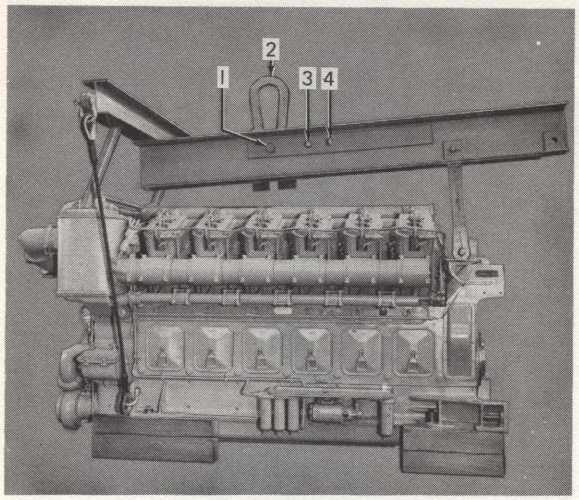
FIG. 5, E-16190B

FIG. 5. POWER PLANT MOUNTING AND ALIGNMENT DETAILS.

Before the assembly is lowered into place, assure mounting surfaces on the engine feet, as well as on the pedestals, are clean and free of chips, weld splatter, or other foreign material. Procedure for properly locating and bolting down the engine-generator set is as follows:

1. Using the lifting rig, lower the assembly to within approximately 1/2 in. of being in place. At the free end, apply a thin layer of grease to the concave side of the belleville washers and place them over the mounting holes, with the convex side up. Insert the mounting pad bolts through each of the four pads and into the pedestals, to act as guides for final lowering.
2. Lower the assembly into place, making sure it is set as far as possible towards the operator's cab. (See NOTE on Fig. 5.) If, as mentioned previously, the same engine is going back into the locomotive and the jacking bolts and one set of wedges have been left in place, position the engine accordingly.
3. Assemble and align the generator to the engine now if it is not already in place. See ASSEMBLING GENERATOR TO ENGINE and ENGINE GENERATOR ALIGNMENT sections.

FIG. 6, E-13248



REF.	DESCRIPTION
1	LIFTING POINT FOR ENGINE ONLY
2	ADJUSTABLE LIFTING EYE
3	LIFTING POINT FOR RIG ONLY
4	LIFTING POINT FOR ENGINE WITH GENERATOR

FIG. 6. SIDE VIEW OF ENGINE WITH LIFTING RIG ATTACHED.

NOTE: *If the generator was assembled to the engine previous to placing the power plant in the locomotive, alignment of the generator must be rechecked after the power plant is in place and before mounting bolts and auxiliary couplings are installed. This is necessary to assure against misalignment during handling.*

4. With the engine mounting bolts finger-tight, connect the compressor shaft couplings. Check the alignment of these couplings according to the procedure outlined in Flexible Couplings instructions. Horizontal misalignment of the couplings may be corrected by moving the power plant laterally using the jacking screws.

   When alignment of the power plant is correct, tighten all of the engine mounting bolts. See Fig. 5 and DATA section for torque values and tightening instructions.

5. Secure the power plant in position as follows:

   a. Cut the wedges to the appropriate length to give 85 percent contact between the engine frame and the platform mounting pedestal. Tap wedges into position. On the old design, tack-weld the retaining plate to the wedge and to the pedestal at each wedge; on the current design, tack-weld the outer end of each wedge to the adjacent pedestal. DO NOT WELD WEDGES TO THE ENGINE FRAME.

   b. Adjust the engine jacking bolts for proper end clearance, and tighten the lock nuts. See DATA section.

   c. Secure the mounting bolts at the free-end of the engine by bending the lock-tabs against the bolt head.

6. Make a final check of the generator alignment to assure misalignment has not developed during installation.

ASSEMBLING GENERATOR TO ENGINE

To mount the generator on the engine, proceed as follows:

1. Thoroughly clean the coupling flanges on both the generator and the engine crankshaft, as well as the finished mounting surfaces on the generator and engine frame. Run a file lightly over the mounting surfaces to remove any nicks or burrs.

2. Pre-align the generator and crankshaft-coupling bolt holes with each other. Match the angular position of two adjacent bolt holes in each flange, using a protractor containing a level bubble. Turn the crankshaft as required to give the correct alignment.

3. Lift the generator and move it carefully up to the engine, aligning it with the dowels in the two upper mounting pads. Insert all the bolts in the mounting pads and screw in several turns. Install all armature-flange coupling bolts with hardened washers, and screw in several turns.

4. Install the generator aligning shims, which were removed at disassembly, in their original positions. (See Fig. 7.)

NOTE: *All alignment of the generator to the engine is done by adding or removing shims at the upper two engine-mounting pads. See Fig. 7. All main generators have 3/32-in. shims permanently welded to their lower two mounting pads. DO NOT REMOVE THESE SHIMS. If this particular engine and generator have not been assembled together previously, as a starting point, add 3/32-in. shims to the upper mounting pads to have an equal thickness at all four mounting points.*

5. Tighten the generator mounting bolts evenly to the torque listed in the DATA section. (See Fig. 8.)

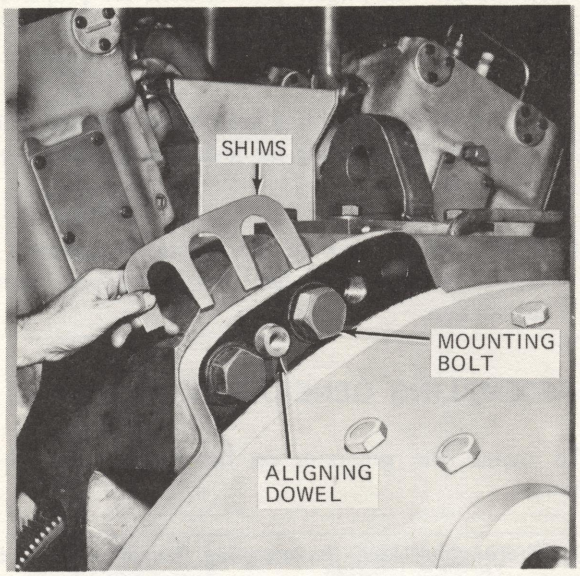


FIG. 7. INSTALLING GENERATOR ALIGNMENT SHIMS.

6. Tighten the armature flange coupling bolts EVENLY to the torque specified in the DATA section. (See Fig. 9.) Bar-over the crankshaft, as necessary.

7. Reinstall the camshaft gear cover.

ENGINE-GENERATOR ALIGNMENT

Engine-generator alignment must be carefully checked and accurately maintained. Improper alignment of the generator with the engine may cause main bearing failure, crankshaft failure, or even a generator shaft failure. Proper alignment must be determined after assembling a generator to an engine. A check of the generator alignment also must be made whenever the power plant has been installed in the locomotive, when main bearings have been renewed, or whenever any signs of distress that could be associated with this alignment are observed.

Engine-generator alignment is determined by measuring the web deflection of the crankshaft at the throw nearest the generator. Procedure for measuring deflection and making necessary corrections follows:

1. With all compression release plugs loose, rotate the crankshaft until the crank pin nearest the generator is approximately 45 degrees from top center. Place the crankshaft deflection gage between these webs, using the punch marks located about 3/16-in. in from the edge of the web. (See Fig. 10.) The crankshaft deflection gage is listed in the Tool Manual. If it is desired to use a gage already on hand, make sure the

FIG. 8. TIGHTENING GENERATOR MOUNTING BOLTS.

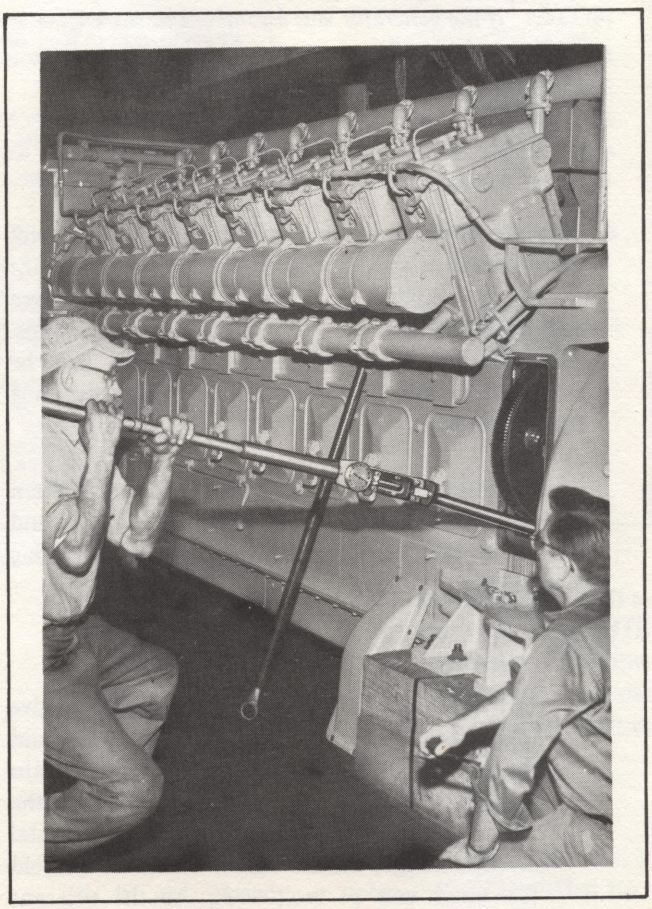


FIG. 9. TIGHTENING GENERATOR-ARMATURE COUPLING BOLTS WITH TORQUE WRENCH.

FIG. 7, E-9939

FIG. 8, E-10033

FIG. 9, E-10032

FIG. 10, E-9937

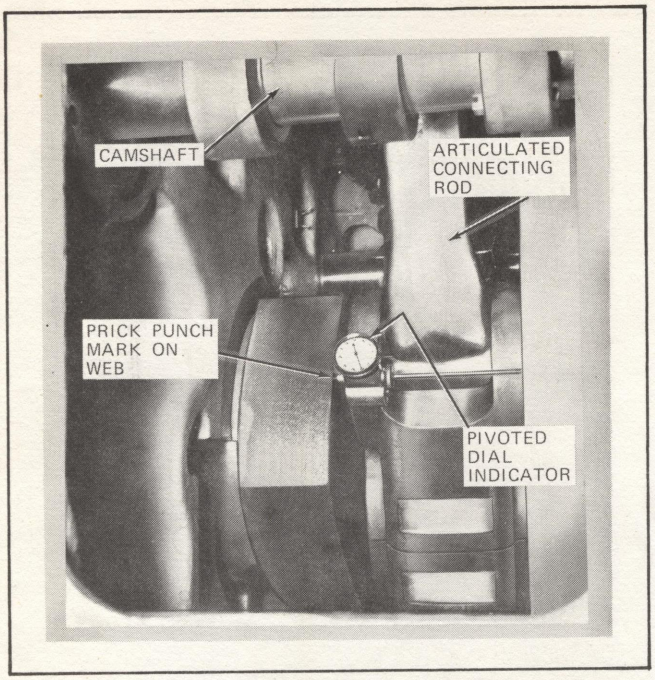


FIG. 10. MEASURING CRANKSHAFT WEB DEFLECTION ON NO. 6 CRANK THROW.

FIG. 11, E-10037

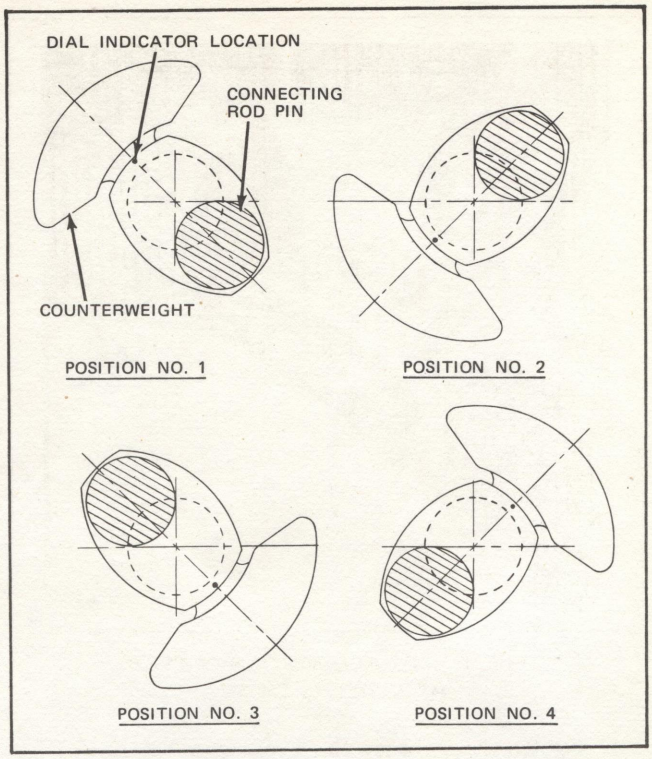


FIG. 11. CRANKSHAFT POSITIONS WHEN MEASURING WEB DEFLECTION.

dial indicator is capable of accurately reading to 0.0005-in. (0,0127 mm) deflection. Assure the gage is parallel to the axis of the crankshaft and is located exactly opposite the centerline of the crankpin.

2. Set the dial indicator at ZERO. While checking the deflection, make very sure that the indicator is not moved with respect to the crankshaft. In addition, remove all strain from the barring-over hub at the free-end of the crankshaft. If this is not done, the readings taken may be inaccurate and later damage may result.
3. Rotate the crankshaft in both directions, taking readings as indicated in Fig. 11. Do not let the connecting rod hit the deflection gage by rotating the crankshaft too far.
4. Then, return the crankshaft to its original position and again check the dial indicator. It should have returned to ZERO. If not, repeat Steps 2, 3 and 4, and, if necessary, check the accuracy of the indicator.
5. The indicator must not show more than the total deflection value specified in the DATA section. If the deflection exceeds this value, correction must be made by changing the shims under the upper bolting pads of the main generator. It will be found that the shim thickness needed will be approximately twelve times the value read on the dial indicator.
6. Make sure the final web deflection readings are taken with all generator armature and frame-to-engine mounting bolts torqued evenly to the values specified in the DATA section.

DATA

	in.	mm
Crankshaft Web Deflection – Measured at No. 6 crankpin on 12-cylinder engines and at No. 4 crankpin on 8-cylinder engines		
Total deflection, original alignment, with new engine and generator	0.0000-0.0005	0,0000-0,0127
Total deflection, realignment with used engine and/or generator	0.0000-0.0020	0,0000-0,0508
Jacking Bolt to Main Frame Clearance at Each Side of Engine		
With engine at ambient temperature	0.010	0,254
Readjust after engine reaches maximum temperature	0.000	0,0000
Torque Values	**lb.-ft.**	**N·m**
Engine mounting bolts		
Generator end	600-650	813-881
Free end	135	183
Generator mounting bolts		
Generator frame to engine frame	625-675	847-915
Crankshaft to generator armature	1040-1160	1410-1573